The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 33

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MORIS M. DOVEK,
G. HERBERT LIN,
and MICHAEL McNEIL

Appeal No. 2002-1966
Application 09/067,795[1]

HEARD: March 13, 2003

Before KRASS, JERRY SMITH, and BARRETT, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(a) from the non-final rejection of claims 1-60.

We affirm-in-part.

[1] Application for patent filed April 28, 1998, entitled (as amended) "Magnetic Storage Device with Flux-Guided Magnetoresistive Head Using a Perpendicular Recording Media."

BACKGROUND

The invention relates to a magnetic recording system that includes a perpendicular recording medium and a flux-guided (yoked) magnetoresistive (MR) read head. The combination has the advantages of producing a readback pulse signal with a substantially Lorentzian readback pulse shape (Fig. 7; compare with ideal Lorentzian shape shown in Fig. 5) without the use of electronic signal processing and the recessed MR head eliminates problems of thermal asperities, electrostatic discharge, and element material corrosion (specification, p. 14, lines 21-26).

Claim 1 is reproduced below.

> 1. A magnetic recording system including a head, a magnetic media with perpendicular magnetic polarity transitions written thereon and circuitry adapted to receive a readback pulse with a substantially Lorentzian pulse shape from said head and to detect said substantially Lorentzian pulse shape, said head for transferring data between the magnetic media and an exterior environment, said head comprising:
>
> a write element for inducing said perpendicular magnetic polarity transitions into a surface of said magnetic media during a write operation;
>
> a yoke having a read gap for sensing said perpendicular magnetic polarity transitions; and
>
> a magnetoresistive read element mounted in a flux flow path of said yoke, wherein said magnetoresistive read element produces a readback pulse having a substantially Lorentzian pulse shape in response to one of said perpendicular magnetic polarity transitions.

The examiner relies on the following references:

Hamilton	4,423,450	December 27, 1983
Somers	5,097,371	March 17, 1992
Hesterman et al. (Hesterman)	5,434,733	July 18, 1995
Tanaka et al. (Tanaka)	5,486,967	January 23, 1996

Claims 1-4, 6, 7, 10, 11, 13-15, 17-19, 21, 24-27, 29-34, 37, 42-50, 53, 55, 57, 58, and 60 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Tanaka as set forth in the Office action, Paper No. 3.

Claims 1-60 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hesterman in view of Hamilton as set forth in the Office actions, Paper Nos. 18, 10, and 3.

Claim 55 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Somers in view of Hamilton as set forth in the Office action, Paper No. 10.

We refer to the Office actions of Paper Nos. 3, 10, and 18, and the examiner's answer[2] (Paper No. 23) (pages referred to as "EA__") for a statement of the examiner's rejection, and to the brief (Paper No. 22) (pages referred to as "Br__") and reply brief (Paper No. 24) (pages referred to as "RBr__") for a statement of appellants' arguments thereagainst.

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[2] The examiner's answer refers to statements of grounds of rejection in three previous Office actions and, thus, does not comply with the <u>Manual of Patent Examining Procedure</u> § 1208 (7th ed. Rev. 1, Feb. 2000) ("Only the statements of grounds of rejection appearing in a <u>single</u> prior action may be incorporated by reference. An examiner's answer should not refer, either directly or indirectly, to more than one prior Office action.").

OPINION

Grouping of claims

For the § 102(b) rejection over Tanaka, the claims are grouped as follows (Br5): (i) claims 1-3[3], 6, 11, 13-15, 17, 19, 21, 24-27, 29, 30, 37[4], 42, 47, 57, 58, and 60; (ii) claims 4, 18, and 43; (iii) claim 7; (iv) claim 10; (v) claim 31; (vi) claim 32; (vii) claim 33; (viii) claim 34; (ix) claim 44; (x) claim 45; (xi) claim 46; (xii) claims 48 and 53; (xiii) claim 49; (xiv) claim 50; and (xv) claim 55. Appellants argue a representative claim in each group (Br6-13).

For the § 103(a) rejection over Hesterman and Hamilton, the claims are grouped as follows (Br5): (i) claims 1-3, 5-17, 19, 21-27, 29-33, 37, 42, 47-50, 52-54, and 58-60; (ii) claims 4, 18, and 43; (iii) claims 7, 28, and 51; (iv) claims 20 and 38; (v) claim 34; (vi) claim 35; (vii) claim 36; (viii) claim 39; (ix) claim 40; (x) claim 41; (xi) claim 44; (xii) claim 45; (xiii) claim 46; (xiv) claim 55; (xv) claim 56; and (xvi) claim 57. Appellants argue a representative claim in each group (Br14-21).

For the § 103(a) rejection over Somers and Hamilton, claim 55 is the sole claim (Br5).

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[3] The grouping of claims does not put claims 2 and 37 in any group. Thus, these claims are added to group (i).

[4] See footnote 2.

Appellants argue (RBr1-3) that the examiner erred in stating (at EA3) that the claims stand or fall together because appellants did not include a statement that the grouping of claims does not stand or fall together and reasons in support thereof. We agree. Appellants stated that the claims in each ground of rejection do not stand or fall together and explained in the argument section of the brief why the claims of each group are believed to be separately patentable. Thus, appellants have complied with the requirements of 37 CFR § 1.192(c)(7) (1999) for having the groups addressed separately. Nevertheless, after consideration of the references and the rejections, and in the interest of administrative economy, we will not remand the case to the examiner to address each group separately. The main issue is the anticipation rejection over Tanaka. Some of the claims were addressed separately in the statement of the rejection. In addition, many of the claim limitations at issue are clearly shown in Tanaka or presumably would have been considered inherent under the examiner's finding of inherency of the independent claims, and appellants are responsible for the teachings of the reference even though not discussed by the examiner. We will not repeat or comment further on appellants' arguments that the examiner did not address the claims.

35 U.S.C. § 102(b) - Tanaka

(i) Claims 1, 3, 6, 11, 13-15, 17, 19, 21, 24-27, 29, 30, 42, 47, 57, 58, and 60

The examiner found that the claimed subject matter is anticipated by Embodiment 8 in Fig. 47 (Paper No. 3, pp. 4-5). The examiner finds that Tanaka shows the combination of a perpendicular magnetic recording medium and a flux-guided (yoked) MR head. Since this combination is described in the specification at page 14, lines 21-26, as producing a readback pulse signal with a substantially Lorentzian-type pulse shape, the examiner found that Tanaka must (inherently) produce a readback pulse signal with a Lorentzian-type pulse shape and must (inherently) contain circuitry for receiving and detecting Lorentzian pulse shapes (Paper No. 10, p. 9).

Appellants argue that Tanaka fails to teach or suggest a read element that produces a readback pulse having a substantially Lorentzian pulse shape or circuitry adapted to detect Lorentzian pulse shapes (Br6-10). It is argued that Tanaka discloses a readback pulse that resembles a sine wave in Figs. 8-10 and 12 for the read element in the first embodiment and makes no distinction between the shape of the readback pulses in the first and eighth embodiment (Br9-10).

The examiner repeats the assertions from Paper No. 10 (EA5).

We agree with the examiner that since a Lorentzian pulse shape is disclosed to result solely from the combination of perpendicular magnetic polarity transitions recorded on a perpendicular magnetic recording medium and a flux-guided (yoked) MR head (specification, p. 14, lines 21-26), which combination is taught in Tanaka, the head in Tanaka must inherently produce a substantially Lorentzian pulse shape and the circuitry must inherently detect substantially Lorentzian pulse shapes. Appellants have not shown these findings to be erroneous. The fact that the term "Lorentzian" is not found in Tanaka does not prevent an anticipation.

However, it is not necessary to rely on inherency since Tanaka expressly discloses a substantially Lorentzian readback pulse shape (although it does not use the term "Lorentzian") in Figs. 7 and 50. We agree with appellants that Tanaka makes no distinction between the shape of the readback pulses in the first and eighth embodiment and, thus, we refer to the operation and signals from the first embodiment. Tanaka describes Fig. 7 as follows (col. 13, lines 30-48):

> [T]he magnetic flux density flowing through each of the poles starts to increase at different time points. As a result, the difference in the magnetic flux density between the fluxes flowing through the main magnetic poles 109a and 109b is largest when the magnetic reversal point comes to the front end of the non-magnetic interlayer 110. The magnetic flux density passing through the MR element 114 is equal to the difference in the magnetic flux density between the two main magnetic poles 109a and 109b. Therefore, the magnetic flux density flowing inside the MR element is largest at the time when the magnetization reversal point comes to the front end of the non-magnetic interlayer 110. Since the resistance of the MR element 114 changes depending on the magnetic flux flowing inside the element, the largest

> reproduction signal voltage can be obtained at the time when the magnetic flux density passing through the MR element is maximum, only by supplying a constant sense current Is which flows through the MR element 114.

Thus, the magnetic flux density passing through the MR element is shown by the MR FILM (114) curve in Fig. 7 (the solid line on the left side of the zero point which is a mirror image of the dashed MR FILM (114) line to the right of the zero point), which is considered to have a substantially Lorentzian pulse shape. This also can be seen in Fig. 50 in the curve "REPRODUCTION MAGNETIC FLUX." The reproduction signal voltage (readback pulse) tracks the flux density "[s]ince the resistance of the MR element 114 changes depending on the magnetic flux flowing inside the element" (col. 13, lines 42-44) and, thus, the reproduction signal waveform (the readback pulse) also has a substantially Lorentzian pulse shape. The peak of the signal occurs near the zero head position (displacement x=0 in Fig. 7) with respect to a perpendicular magnetization reversal point (col. 13, lines 39-42; Fig. 7; Fig. 50 - note how peak lines up with transition), i.e., at the zero head position with respect to a perpendicular magnetic polarity transition, as recited in claims 4, 18, and 43, the claims of group (ii). The readback pulse in Fig. 7 has a peak near and is substantially symmetric about the zero head position with respect to perpendicular magnetic polarity transitions, as recited in claim 44, the claim of group (ix), and claim 45, the claim of group (x). The readback pulse has a single voltage polarity with respect to a baseline voltage between readback pulses (Fig. 7; "REPRODUCTION MAGNETIC FLUX" in Fig. 50), as recited in claim 46, the claim of group (xi).

The reproduction signal waveform (the readback pulse) is differentiated to detect data at the zero-crossing points as shown in Figs. 8-10 (col. 13, lines 49-51). While the brief description of the drawings refers to Figs. 8-10 as the waveform of a reproduction signal formed by the magnetic head (col. 9, lines 55-57), column 13 makes it clear that these figures refer to signals <u>after</u> the reproduction signal waveform (readback pulse) in Fig. 7 is differentiated. Thus, the circuitry in Tanaka detects and processes Lorentzian pulse shapes, as recited in the independent claims of group (i) and claim 34, the claim of group (viii). How the circuitry detects and processes the Lorentzian pulse shape is not claimed. The rejection of claims 1-3, 6, 11, 13-15, 17, 19, 21, 24-27, 29, 30, 37, 42, 47, 57, 58, and 60 in group (i) over Tanaka is sustained.

(ii) <u>Claims 4, 18, and 43</u>

Appellants argue that Tanaka does not disclose that "said substantially Lorentzian pulse shape includes a peak near zero head position with respect to said one of said perpendicular magnetic polarity transitions," as recited in representative claim 4 (Br10-11).

Presumably the examiner would find the limitation an inherent result of the structure, although some express statement to this effect should have been made. Nevertheless, Tanaka teaches this limitation as discussed in connection with group (i). The rejection of claims 4, 18, and 43 is sustained.

(iii) <u>Claim 7</u>

The examiner finds that Tanaka discloses "a non-magnetic spacer (i.e., between 923 and 924) for substantially preventing flux flow through the write element during a read operation" (Paper No. 3, p. 5).

Appellants argue that the gap between the read and write element is not a spacer within the write element (Br11).

We agree with appellants that an air gap is not a non-magnetic spacer, because a non-magnetic spacer implies some solid substance that holds (spaces) two things apart, not empty space. However, Tanaka discloses that "[a] U-shaped return magnetic pole 924 is provided in parallel and adjacent to the MR terminal 923, with an insulation layer being interposed between this magnetic pole and the MR element" (col. 29, lines 57-60). The examiner apparently did not appreciate this express teaching of an insulation layer. We find that this (unshown) insulation layer is a non-magnetic spacer, as claimed, absent argument to the contrary. The rejection of claim 7 is sustained.

(iv) Claim 10

The examiner states that Tanaka "shows first (920a), second (920b) and third (924) pole pieces that are in a common plane with the read gap" (Paper No. 3, p. 5).

Appellants argue that the third pole 924 is not in a common plane with the first and second pole pieces 920a and 920b (Br10).

We agree with appellants that the end of the pole piece 924 in Fig. 47 is clearly shown further away from the magnetic disk 902 than the ends of pole pieces 920a and 920b and that claim 10 is not anticipated. The rejection of claim 10 is reversed.

(v) Claim 31

Appellants argue that Tanaka fails to teach that "said magnetoresistive read element is sufficiently recessed from said magnetic storage media to prevent thermal asperities in said magnetoresistive read element," as recited in claim 31 (Br11).

Figure 47 of Tanaka clearly shows the MR element 923 recessed from the magnetic storage medium 902. It was known that recessing the MR element with a yoke solves the problem of thermal asperities (specification, p. 5). In addition, Tanaka teaches that the MR element is recessed to prevent abrasion of the MR element by the magnetic medium (e.g., col. 4, lines 38-43; col. 14, line 35), which is the cause of thermal asperities (specification, pp. 3-4). Thus, Tanaka inherently satisfies claim 31. The rejection of claim 31 is sustained.

(vi) Claim 32

Appellants argue that Tanaka fails to teach that "said magnetoresistive read element is sufficiently recessed from said magnetic storage media to prevent electrostatic discharge between said magnetoresistive read element and said magnetic storage media," as recited in claim 32 (Br11).

Figure 47 of Tanaka clearly shows the MR element 923 recessed from the magnetic storage medium 902. It was known that recessing the MR element with a yoke solves the problem of electrostatic discharge between the MR element and the magnetic storage medium (specification, p. 5). Thus, Tanaka inherently satisfies claim 32. The rejection of claim 32 is sustained.

(vii) Claim 33

Appellants argue that Tanaka fails to teach that "said magnetoresistive read element is sufficiently recessed from said magnetic storage media to prevent chemicals on said magnetic storage media from corroding said magnetoresistive read element," as recited in claim 33 (Br12).

Figure 47 of Tanaka clearly shows the MR element 923 recessed from the magnetic storage medium 902 and one of ordinary skill in the art would have known that the head elements have to be sealed in an insulator to maintain the relative position of pieces and to provide protection from the environment, as shown, by insulating layer 909 in Fig. 46. It was known that recessing the MR element and sealing it an insulator prevents chemicals on the magnetic storage media from corroding said MR read element (specification, pp. 5-6). Thus, Tanaka inherently satisfies claim 33. The rejection of claim 33 is sustained.

(viii) Claim 34

Appellants argue that Tanaka fails to teach that "said detector includes means for detecting Lorentzian pulse shapes," as recited in claim 34 (Br12).

Tanaka teaches this limitation as discussed in connection with group (i). The rejection of claim 34 is sustained.

(ix) Claim 44

Appellants argue that Tanaka fails to teach that "said readback pulses are substantially symmetric about zero head positions with respect to said perpendicular magnetic polarity transitions," as recited in claim 44 (Br12). It is argued that Tanaka discloses readback pulses that resemble sine waves in which the midpoint is near zero head position (Br12).

Tanaka teaches this limitation as discussed in connection with group (i). The readback pulse has the substantially Lorentzian shape shown by the MR FILM (114) curve in Fig. 7 since the reproduction signal voltage (readback pulse) tracks the magnetic flux density in the MR element. The sine wave-shaped curves in Figs. 8-10 are the readback pulse after it has been differentiated and are part of the detection process. The rejection of claim 44 is sustained.

(x) Claim 45

Appellants argue that Tanaka fails to teach that "said readback pulses have peaks near and are substantially symmetric about zero head positions with respect to said perpendicular magnetic polarity transitions," as recited in claim 45 (Br12). It is argued that Tanaka discloses readback pulses that resemble sine waves in which the midpoint is near zero head position (Br12).

Tanaka teaches this limitation as discussed in connection with group (i). The readback pulse has the substantially Lorentzian shape shown by the MR FILM (114) curve in Fig. 7 since the reproduction signal voltage (readback pulse) tracks the magnetic flux density in the MR element. The sine wave-shaped curves in Figs. 8-10 are the readback pulse after it has been differentiated and are part of the detection process. The rejection of claim 44 is sustained.

(xi) Claim 46

Appellants argue that Tanaka fails to teach that "said readback pulses have a single voltage polarity with respect to a baseline voltage between said readback pulses," as recited in claim 46 (Br12-13). It is argued that Tanaka discloses readback pulses that resemble sine waves in which the midpoint is near zero head position (Br12-13).

Tanaka teaches this limitation as discussed in connection with group (i). The readback pulse has the substantially Lorentzian shape shown by the MR FILM (114) curve in Fig. 7 since the reproduction signal voltage (readback pulse) tracks the magnetic flux density in the MR element and this pulse has a single voltage polarity. The sine wave-shaped curves in Figs. 8-10 are the readback pulse after it has been differentiated and are part of the detection process. The rejection of claim 46 is sustained.

(xii) Claims 48 and 53

Appellants argue that Tanaka fails to teach the yoke arrangement of first, second, and third pole pieces recited in claim 48 (Br13).

The first, second, and third pole pieces read on poles 920a, 920b, and 924, respectively, in Tanaka. The return magnetic pole 924 is magnetically coupled with the main magnetic poles 920a and 920b (col. 29, lines 62-65). Poles 920a and 924 are in the write flux guide (note that claim 48 does not preclude the second pole 920b from also being part of the write flux guide) and poles 920a and 920b are in the read flux guide and provide read poles that define the read gap. Appellants have not addressed the clear teachings of Tanaka. The rejection of claims 48 and 53 is sustained.

(xiii) Claim 49

Appellants argue that Tanaka fails to teach the first, second, and third pole pieces substantially aligned with one another in a plane and that the examiner erred in finding that the pole pieces are in a common plane (Br13).

We agree with appellants for the reasons stated with respect to group (iv). The rejection of claim 49 is reversed.

(xiv) Claim 50

Appellants argue that Tanaka fails to teach "said magnetoresistive read element connects with said first and second pole pieces," as recited in claim 50 (Br13).

Figure 47 of Tanaka clearly shows the MR element 923 connecting with the first pole piece 920a and the second pole piece 920b. The anticipation rejection of claim 50 is sustained.

(xv) Claim 55

Appellants argue that Tanaka fails to teach "said head includes write coils disposed between said first and third pole pieces but not between said first and second pole pieces," as recited in claim 55, and that the examiner has not even attempted to address this feature (Br13).

Claim 55 is directed to the embodiment in appellants' Fig. 6. Figure 47 of Tanaka shows the write coil 925 between both the first pole 920a and third pole 924 and between the second pole 920b and the third pole 924. Thus, claim 55 is not anticipated by Tanaka. The rejection of claim 55 is reversed.

35 U.S.C. § 103(a) - Hesterman in view of Hamilton

The examiner finds that Hesterman teaches the subject matter of the independent claims except that Hesterman does not show a perpendicular medium (Paper No. 3, p. 6). The examiner finds that Hamilton teaches that ring or thin film heads can be used to read/write data on perpendicularly oriented media (Paper No. 3, p. 7). The examiner concludes that "[o]ne of ordinary skill in the art at the time of the invention would have been motivated to use the head of Hesterman et al to record on perpendicular media as taught by Hamilton since perpendicular media increases the amount of information that can be stored due to its higher density" (Paper No. 3, p. 7); see also EA5.

Appellants argue (Br16): "Hesterman et al. fails to teach or suggest that head 10 is designed to operate with a perpendicular recording medium. In fact, in view of magnetic shunt 16 across write gap 17, it is especially unclear how the perpendicular recording flux needed to write to the recording medium as shown in Fig. 3 of Hamilton would be achieved." See also RBr5.

The examiner does not answer appellants' argument. We agree with appellants that Hesterman does not teach a head that can write to perpendicular magnetic media and, therefore, it would not have been obvious to combine the head of Hesterman with the perpendicular recording medium of Hamilton. The write head of Hesterman has longitudinally-disposed pole pieces with a perpendicular write gap 17 that is aligned to record in the longitudinal direction of the magnetic medium in the conventional manner of ring-type heads. Recording to the magnetic medium in the perpendicular direction requires a head oriented perpendicular to the magnetic medium surface as shown in Hamilton and also Tanaka. Contrary to the examiner's statement that Hamilton teaches that ring-type head can be used to read/write data on perpendicularly oriented media (Paper No. 3, p. 7), Hamilton discloses that a ring-type recording would have the recording medium moved through the gap between the poles to produce perpendicular recording (col. 1, lines 41-48), which is not possible in Hesterman. Tanaka also discusses that ring-type heads generate a large magnetic field in the longitudinal direction and are not applicable to the perpendicular recording system (col. 2, lines 55-62). Claims 1 and 30 expressly require a write element for inducing perpendicular magnetic polarity transitions in the magnetic storage medium. There is no motivation for one of ordinary skill in the art to combine

Hesterman and Hamilton because the write head in Hesterman is incapable of writing to perpendicular recording media. Claim 17 only requires a read element. Nevertheless, there is no motivation to use the perpendicular recording medium of Hamilton in Hesterman because Hesterman is incapable of writing to the magnetic medium even if it can read a medium which had been previously recorded on the medium. The examiner has failed to establish a prima facie case of obviousness. The rejection of claims 1-60 over Hesterman and Hamilton is reversed.

35 U.S.C. § 103(a) - Somers in view of Hamilton

Since claim 55 depends on claim 48, which depends from claim 47, which depends from independent claim 30, and since claim 55 incorporates by reference all of the limitations of claims 30, 47, and 48, it is not known why the examiner did not also include claims 30, 47, and 48 in the statement of rejection.

The examiner finds that Somers teaches the subject matter of claim 55 except that Somers does not show the perpendicular recording medium or the circuitry for receiving readback pulses from the MR read element (Paper No. 10, p. 8). The examiner takes Official Notice that perpendicular magnetic recording media were old and well known and that the circuitry for reading Lorentzian pulse shaped signals was also old and well known in the art (Paper No. 10, p. 8). The examiner finds that Hamilton teaches that ring or thin film heads can be used to read/write data on perpendicularly oriented media (Paper No. 10, p. 8). The examiner concludes that "[o]ne of ordinary skill in the art at the time of the invention would have been motivated to use the head of Somers to record on perpendicular media as taught by Hamilton with circuitry for receiving the readback pulses since perpendicular media increase the amount of information that can be stored due to it's [sic] higher density" (Paper No. 10, p. 8).

Appellants argue that Somers and Hamilton fail to teach or suggest a yoked MR read element that produces a Lorentzian-shaped readback pulse in response to a perpendicular magnetic polarity transition, much less circuitry adapted to receive and detect such a pulse (Br22).

We will not sustain the rejection because the stated rejection is based on impermissible hindsight. We tend to agree with the examiner's conclusion that it would have been obvious to use the head of Somers with the perpendicular recording media of Hamilton to obtain the known advantages of higher recording density in perpendicular media. The write head of Somers is capable of perpendicular recording (unlike the write head in Hesterman). However, the examiner extends this by stating that one skilled in the art would then recognize that the readback pulse shape is inherently Lorentzian and would have used well known circuitry for detecting Lorentzian pulse shapes. While the combination of a flux-guided (yoked) MR head and a perpendicular recording medium would inherently produce a Lorentzian readback pulse shape, as discussed by appellants (specification, p. 14, lines 21-25), this is appellants' teaching and is not disclosed in Somers or Hamilton or shown to be well known. The examiner seems to use one reason to combine the references (to achieve higher recording density), but silently used appellants' disclosure to reach the ultimate obviousness conclusion, which we consider improper. In addition, the examiner improperly relies on the obviousness of modifying the combination of Somers and Hamilton based on an inherent property resulting from the combination, which has not been shown to be well known. "That which may be inherent is not necessarily known. Obviousness cannot be predicated on what is unknown." In re Spormann, 363 F.2d 444, 448, 150 USPQ 449, 452 (CCPA 1966). We conclude that the examiner has failed to establish a prima facie case of obviousness. The rejection of claim 55 is reversed.

CONCLUSION

The rejection of claims 1-4, 6, 7, 11, 13-15, 17-19, 21, 24-27, 29-34, 37, 42-48, 50, 53, 57, 58, and 60 under 35 U.S.C. § 102(b) over Tanaka is sustained. The rejection of claims 10, 49, and 55 under § 102(b) over Tanaka is reversed.

The rejection of claims 1-60 under § 103(a) over Hesterman and Hamilton is reversed.

The rejection of claim 55 under § 103(a) over Somers and Hamilton is reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

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